Introduction

There are many Quality Assurance parameters that a user of may use to filter AIRS/AMSU/HSB data to create a subset for analysis. A complete description is provided in the file, **V3.0_Release_ProcFileDesc.pdf**, which may be accessed through a link in the main **V3.0 L2 Data Release Documentation**. The novice user will find the plethora of QA parameters overwhelming, hence this document provides a quick start identification of the most basic QA parameters that a user should access before using any data for analysis.

The QA parameters may be static or dynamic. If dynamic, their timescale and scope can range from global to all channels to per footprint to a single channel in a footprint.

Quick Start QA for AIRS L1B Data

Static Per-Channel Quality Checks

Some AIRS detector will have properties that will rule out their use for some purposes. The individual properties of each of the 2378 AIRS IR channels are summarized in a series of channel properties files keyed by effective start date. Please refer to the main **V3.0 L2 Data Release Documentation** for links to these files, which contain detailed characterizations of all channels. They are current for L1B data V3.0.8.0 and V3.0.9.0.

Beginning users of AIRS L1B radiances should select channels whose entries in the appropriate channel properties file satisfy these criteria at a minimum:

Criterion	column	required value
AB_State	11	0, 1 or 2
Radiometric quality	12	0
L2_ignore	13	0

Per-Granule-Per-Channel Quality Checks

Do not use any data where the "**spectral anomaly**" or "**noise out of bounds**" bits in per-granule field "**CalChanSummary**" are set. These are bits 2 & 3 respectively where bit 0 is the least significant bit (LSB).

Per-Scan-Per-Channel Quality Checks

The AIRS L1B product contains a per-scan field named "**CalFlag**". Users should avoid using any channel for any scan in which the "**offset problem**" or "**gain problem**", or "**pop detected**" bits are set (bits 6, 5, and 4 respectively where bit 0 is LSB).

Per-Field-of-View Quality Checks

Before using any AIRS L1B radiance, check the value of the corresponding "**state**" to ensure that it is equal to zero. There is one "**state**" value per field-of-view (FOV), and it is valid for all 2378 channels in that FOV. The "**state**" valids and their meaning are:

State Valid	State Value	Meaning
Process	0	normal data
Special	1	instrument in special calibration mode when this data was taken (e.g., staring at nadir)
Erroneous	2	data known bad (e.g., instrument in safe mode)
Missing	3	data are missing

Per-Channel Quality Checks

Individual channel readings ("**radiances**") must be checked for the flag bad value of **–9999.0**. A channel reading is set to this value by the PGE when it becomes suspect during processing.

Note that small negative radiances for shortwave channels
(2000 to 2700 cm^{-1}) are rare, but valid. The negative radiances occur when the scene temperature is extremely cold, for example, over very high cloud or very cold surface.

Advanced Quality Checks

Each scan contains a "**glintlat**" and "**glintlon**" giving the location of the solar glint center at the time in the middle of that scan. Users can use these or the per-field-of-view "**sun_glint_distance**" to check for possibility of solar glint contamination.

Infrared glints can occur over clouds as well as water and can extend up to several hundred km.

Quick Start QA for VIS/NIR L1B Data

Per-Field-of-View Quality Checks

Before using any VIS/NIR L1B radiance, check the value of the corresponding "**state**" to ensure that it is equal to zero. There is one "**state**" value per field-of-view (FOV), and it applies to all 8x9 pixels of all 4 channels in that FOV. The "**state**" valids and their meaning are:

State Valid	State Value	Meaning
Process	0	normal data
Special	1	instrument in special calibration mode when this data was taken (e.g., staring at nadir)
Erroneous	2	data known bad (e.g., instrument in safe mode)
Missing	3	data are missing

Per-Channel Quality Checks

Individual channel readings ("**radiances**") must be checked for the flag bad value of **–9999.0**. A channel reading is set to this value by the PGE when it becomes suspect during processing.

Advanced Quality Checks

Each scan contains a "**glintlat**" and "**glintlon**" giving the location of the solar glint center at the time in the middle of that scan. Users can use these or the per-field-of-view "**sun_glint_distance**" to check for possibility of solar glint contamination.

Quick Start QA for AMSU-A L1B Data

Per-Scan Quality Checks

Before using any AMSU-A1 or AMSU-A2 L1B brightness temperature, check the value of the corresponding "**state1**" or "**state2**" to ensure that it is equal to zero.

There is one "**state1**" value for all 30 fields-of-view of a scan, and it is valid for all AMSU-A1 channels (AMSU-A channels 3 through 15).

There is one "**state2**" value for all 30 fields-of-view of a scan, and it is valid for all AMSU-A2 channels (AMSU-A channels 1 and 2).

The "**state1**" and "**state2**" valids and their meaning are:

State Valid	State Value	Meaning
Process	0	normal data
Special	1	instrument in special calibration mode when this data was taken (e.g., staring at nadir)
Erroneous	2	data known bad (e.g., instrument in safe mode)
Missing	3	data are missing

Per-Channel Quality Checks

Individual channel readings ("**antenna_temp**" or "**brightness_temp**") must be checked for the flag bad value of **–9999.0**. A channel reading is set to this value by the PGE when it becomes suspect during processing.

Advanced Quality Checks

Each scan contains a "**glintlat**" and "**glintlon**" giving the location of the solar glint center at the time in the middle of that scan. Users can use these or the per-field-of-view "**sun_glint_distance**" to check for possibility of solar glint contamination.

Serious glint contamination of AMSU window channels (channels 1,2,3, and 15) is seen when the scene contains substantial water (landFrac < 0.5) and "**sun_glint_distance**" is less than ~50km.

"**qa_receiver_a11**", "**qa_receiver_a12**", "**qa_receiver_a2**", bits 2-6 and "**qa_channel**" bits 0-6 indicate conditions that can potentially, but not usually,

impact data quality. Users who require pristine data should discard data when any of these bits are set.

Quick Start QA for HSB L1B Data

Per-Scan Quality Checks

Before using any HSB L1B brightness temperature, check the value of the corresponding "**state**" to ensure that it is equal to zero. There is one "**state**" value for all 90 fields-of-view of a scan, and it is valid for all 4 implemented channels. The "**state**" valids and their meaning are:

State Valid	State Value	Meaning
Process	0	normal data
Special	1	instrument in special calibration mode when this data was taken (e.g., staring at nadir)
Erroneous	2	data known bad (e.g., instrument in safe mode)
Missing	3	data are missing

Per-Channel Quality Checks

Individual channel readings ("**antenna_temp**" or "**brightness_temp**") must be checked for the flag bad value of **–9999.0**. A channel reading is set to this value by the PGE when it becomes suspect during processing.

HSB Channel 1 was never implemented, so will always be –9999.0.

HSB data are unavailable after February 5, 2003 due to instrument failure.

Advanced Quality Checks

Each scan contains a "**glintlat**" and "**glintlon**" giving the location of the solar glint center at the time in the middle of that scan. Users can use these or the per-field-of-view "**sun_glint_distance**" to check for possibility of solar glint contamination.

Some glint contamination is seen on HSB channel 2 when the scene contains substantial water (landFrac < 0.5) and "**sun_glint_distance**" is less than ~50km.

"**qa_receiver**" bits 2-6 and "**qa_channel**" bits 0-6 indicate conditions that can potentially, but not usually, impact data quality. Users who require pristine data should discard data when any of these bits are set.